Old and New Perspectives on Effective Equations

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In this talk, we consider nonlinear-Schrödinger-type equations as partial differentiation equations (PDEs) arising as effective descriptions of systems of finitely many interacting bosons. We approach this topic from two perspectives. The *old* perspective consists of proving quantitative convergence in an appropriate function space of solutions to the finite problem to a solution of an effective, limiting PDE, as the number of particles tends to infinity. The *new* perspective consists of proving qualitative convergence of geometric structure, such as the properties of being an integrable and Hamiltonian system. Through these two complementary perspectives, focusing on both quantitative and qualitative convergence, we gain a deeper understanding of how field theories, both classical and quantum, may be deformed to a new field theory, and of how this deformation may be reversed.